

CLAIMS

What is claimed is:

1. A tool for the installation of a cable tie having an elongate tail, said tool comprising:
a generally pistol-shaped housing including a grip which depends from a barrel, said barrel and grip each having a respective longitudinal axis which is generally contained in or parallel to a central plane of said housing;

a trigger mechanism including a trigger linkage having an elongate trigger member one end of which is pivotally connected to said grip generally adjacent to a distal end thereof, said trigger member having a longitudinal axis which is generally contained in or parallel to said central plane, said pivotal connection providing for pivoting of said trigger member between open and closed positions,

said trigger mechanism including an intermediate linkage connected at one end to said trigger member, said intermediate linkage extending into said housing; and

a tensioning mechanism extending into said housing through a distal end of said barrel, said tensioning mechanism providing for coupling of another end of said intermediate linkage to the tail such that pivoting of said trigger member toward said closed position causes pivoting of said intermediate linkage resulting in said tensioning mechanism producing increased tension in the tail.

2. A tool according to claim 1, wherein said trigger member has a distal region the distance of which from said grip is greater than the distance between said pivotal connection and said grip when said trigger member is in said open position.

3. A tool according to claim 1, wherein said intermediate linkage comprises a finger member positioned within said housing, said finger member having one end pivotally connected to said grip generally adjacent to said distal end thereof, the other end of said finger member being coupled to said tensioning mechanism, said finger member having a longitudinal axis which is generally contained in or parallel to said central plane, said pivotal connection providing for pivoting of said finger member between open and closed positions, said coupling between said finger member and tensioning mechanism producing said increased tension in the tail when said finger member is pivoted toward said closed position.

4. A tool according to claim 3, and further comprising a stop fixed to said barrel such that said stop is engaged by said finger member when said finger member is in said open position, said stop preventing pivoting of said finger member beyond said open position.

5. A tool according to claim 3, wherein said intermediate linkage further comprises an elongate intermediate link having one end pivotally connected to said finger member, the other end of said intermediate link being pivotally connected to said trigger member, said pivotal connections of said intermediate link being offset from one another such that the intermediate link is inclined relative to said trigger and finger members wherein pivoting of said trigger

member toward said closed position causes said intermediate link to pivot relative to said trigger and finger members resulting in said finger member pivoting toward said closed position.

6. A tool according to claim 5, wherein said pivotal connection of said intermediate link to said finger member is closer to said barrel as compared to said pivotal connection of said intermediate link to said trigger member.

7. A tool according to claim 1, and further comprising a return spring connected to said trigger linkage and intermediate linkage such that said return spring resists pivoting of said trigger member toward said closed position.

8. A tool according to claim 1, wherein said trigger member defines an inner trigger member, said trigger linkage further including an elongate outer trigger member one end of which is pivotally connected to the end of said trigger member opposite said one end thereof, said outer trigger member having a longitudinal axis which is generally contained in or parallel to said central plane, said pivotal connection of said outer trigger member providing for pivoting thereof between open and closed positions such that pivoting of said outer trigger member toward said closed position causes the pivoting of said intermediate linkage.

9. A tool according to claim 8 wherein said trigger members and intermediate linkage are shaped and sized such that displacement of said outer trigger member toward said grip produces a reverse sequential pivoting of said trigger members wherein said displacement produces an

initial pivoting of said outer trigger member relative to said inner trigger member in an initial direction toward said closed position, said initial pivoting causing pivoting of said intermediate linkage to cause said tensioning mechanism to produce said increased tension in the tail,

said reverse sequential pivoting providing for continued displacement of said outer trigger member toward said grip causing subsequent pivoting of said inner trigger member relative to said grip in a subsequent direction toward said closed position, said subsequent direction being opposite from said initial direction, said subsequent pivoting causing pivoting of said intermediate linkage resulting in said tensioning mechanism producing the increased tension in the tail.

10. A tool according to claim 9, wherein said trigger members and intermediate linkage are shaped and sized such that pivoting of said inner trigger member relative to said grip is substantially limited during said initial pivoting, said initial pivoting of said outer trigger member relative to said inner trigger member being limited such that reaching said limit substantially prevents continued pivoting of said outer trigger member in said initial direction and causes initiation of said subsequent pivoting, pivoting of said outer trigger member relative to said inner trigger member being substantially limited during said subsequent pivoting.

11. A tool according to claim 8, and further comprising a stop fixed to said barrel such that said stop is engaged by said inner and outer trigger members when said trigger members are in said respective open positions, said stop preventing pivoting of said inner and outer trigger members beyond said respective open positions.

12. A tool according to claim 8, wherein said intermediate linkage comprises a finger member positioned within said housing, said finger member having one end pivotally connected to said grip generally adjacent to said distal end thereof, the other end of said finger member being coupled to said tensioning mechanism, said finger member having a longitudinal axis which is generally contained in or parallel to said central plane, said pivotal connection providing for pivoting of said finger member between open and closed positions, said coupling between said finger member and tensioning mechanism producing said increased tension in the tail when said finger member is pivoted toward said closed position.

13. A tool according to claim 12, wherein said intermediate linkage comprises a central link and inner and outer links,

said central link having one end pivotally connected to said inner trigger member,

said inner link having one end pivotally connected to said finger member, the other end of said inner link being pivotally connected to said central link,

said outer link having one end pivotally connected to said outer trigger member, the other end of said outer link being pivotally connected to said other ends of said central and inner links,

each of said links having a longitudinal axis each of which is generally contained in or parallel to said central plane, said links having a generally Y-shaped configuration when said trigger members are each in said respective open positions.

14. A tool according to claim 13 wherein said grip has an inner surface which faces said inner trigger member, said inner surface having a recess into which portions of said central and inner lateral links are received when said trigger members are pivoted to said respective closed positions.

15. A tool according to claim 7, and further comprising a return spring connected to said outer trigger member and intermediate linkage such that said return spring resists pivoting of said outer trigger member toward said closed position.

16. A tool according to claim 15, wherein said return spring is generally elongate and has a longitudinal axis generally contained in or parallel to said central plane.

17. A tool according to claim 8, wherein said outer trigger member has a lower corner portion and an upper inclined portion, said inner trigger member having an intermediate segment between upper and lower segments, said intermediate segment being inclined relative to said upper and lower segments such that said intermediate segment is outward of an inner axis, said inner axis being generally contained in or parallel to said central plane, said inner axis intersecting said pivotal connection between said inner and outer trigger members, said inner axis further intersecting said pivotal connection between said inner trigger member and grip.

18. A tool according to claim 17, and further comprising a generally elongate return spring connected to said outer trigger member generally at the intersection between said lower corner portion and upper inclined portion, said return spring being further connected to said pivotal connection of said finger member to said grip, said return spring having a longitudinal axis generally contained in or parallel to said central plane such that said return spring resists pivoting of said outer trigger member toward said closed position.

19. A tool according to claim 8 wherein said housing comprises an outer shell including a shell body in which said barrel and grip are supported, said outer shell further comprising a trigger cover pivotally connected to said shell body such that said trigger cover is in depending relation to said barrel, said pivotal connection providing for pivoting of said trigger cover between open and closed positions, said trigger cover being located outwardly relative to said outer trigger member such that pivoting of said trigger cover toward said closed position causes said trigger cover to contact said outer trigger member urging said outer trigger member to pivot to said closed position.

20. A tool according to claim 19 wherein said housing comprises a roller rotatably supported by said trigger cover such that a portion of said roller extends outwardly beyond said trigger cover, said roller having an axis of rotation the orientation of which is generally the same as a longitudinal axis of said trigger cover, said roller being rotated by at least one of the fingers of the user's hand when the user's hand is closed to pivot said trigger cover to said closed position.

21. A tool according to claim 20 wherein said trigger cover comprises a cover member and a longitudinal window formed in said cover member, said trigger cover further comprising upper and lower flanges mounted on respective upper and lower ends of said window, said roller having opposite ends connected to respective ones of said upper and lower flanges to allow said rotation of said roller, said connection of said roller to said flanges positioning said roller generally within said window and obstructing longitudinal, transverse and lateral displacement of said roller relative to said cover member.

22. A method for operating a tool for installing a cable tie having an elongate tail, the tool having

a generally pistol-shaped housing including a grip which depends from a barrel, the barrel and grip each having a respective longitudinal axis which are generally contained in or parallel to a central plane of the housing,

a trigger mechanism including an elongate trigger member one end of which is pivotally connected to the grip generally adjacent to a distal end thereof, the trigger member having a longitudinal axis which is generally contained in or parallel to the central plane, the pivotal connection providing for pivoting of the trigger member between open and closed positions,

the trigger mechanism including an intermediate linkage connected at one end to the trigger member, the intermediate linkage extending into the housing; and

a tensioning mechanism extending into the housing through a distal end of the barrel, the tensioning mechanism providing for coupling of another end of the intermediate linkage to the tail,

said method comprising:

pivoting the trigger member to the open position;

positioning the tool such that the distal end of the barrel is adjacent to the tail;

coupling the tail to the tensioning mechanism;

grasping the trigger member and grip such that the fingers of the user's hand partially encircle the trigger member and the heel of the user's hands abuts the grip, the fingers being oriented along the trigger member so that the smaller fingers are between the larger fingers and pivotal connection; and

closing the user's hand to cause the trigger member to pivot to the closed position wherein the travel of the larger fingers toward the grip is greater than the travel of the smaller fingers toward the grip, the pivoting of the trigger member toward the closed position causing

pivoting of the intermediate linkage resulting in the tensioning mechanism producing increased tension in the tail.

23. A method for operating a tool for installing a cable tie having an elongate tail, the tool having

a generally pistol-shaped housing including a grip which depends from a barrel, the barrel and grip each having a respective longitudinal axis which are generally contained in or parallel to a central plane of the housing,

a trigger mechanism including an elongate inner trigger member one end of which is pivotally connected to the grip generally adjacent to a distal end thereof, the inner trigger member having a longitudinal axis which is generally contained in or parallel to the central plane, the pivotal connection providing for pivoting of the inner trigger member between open and closed positions,

the trigger mechanism including an elongate outer trigger member one end of which is pivotally connected to the end of the inner trigger member opposite the one end thereof, the outer trigger member having a longitudinal axis which is generally contained in or parallel to the central plane, the pivotal connection of the outer trigger member providing for pivoting thereof between open and closed positions,

the trigger mechanism including an intermediate linkage connected at one end to the trigger member, the intermediate linkage extending into the housing; and

a tensioning mechanism extending into the housing through a distal end of the barrel, the tensioning mechanism providing for coupling of another end of the intermediate linkage to the tail,

said method comprising:

pivoting the trigger members to the respective open positions;

positioning the tool such that the distal end of the barrel is adjacent to the tail;

coupling the tail to the tensioning mechanism;

grasping the outer trigger member and grip such that the fingers of the user's hand partially encircle the outer trigger member and the heel of the user's hand abuts the grip; and

closing the user's hand to cause the trigger members to pivot toward the closed positions resulting in pivoting of the intermediate linkage causing the tensioning mechanism to produce increased tension in the tail.

24. A method according to claim 23, wherein said step of closing the user's hand comprises a reverse sequential pivoting step comprising:

- an initial pivoting of the outer trigger member relative to the inner trigger member in an initial direction toward the closed position, and
- continued displacement of the outer trigger member toward the grip to produce a subsequent pivoting of the inner trigger member relative to the grip in a subsequent direction toward the closed position, the subsequent direction being opposite from the initial direction, the pivoting of the trigger members causing the pivoting of the intermediate linkage.

25. A method according to claim 23, wherein said step of closing the user's hand comprises displacement of the outer trigger member toward the grip in a generally linear direction relative thereto, the pivoting of the trigger members to the respective closed positions causing the pivoting of the intermediate linkage.

26. A method according to claim 23, wherein the grip has a recess in the surface thereof facing the trigger members, said step of closing the user's hand comprises displacing the trigger members sufficiently so that a portion of the intermediate linkage is received in the recess.